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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application

Applicant(s):	Knebel et al.
Docket No.:	YOR920030213US1
Serial No.:	10/643,549
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Group:	2138
Examiner:	Dipakkumar B. Gandhi
Title:	Frequency Modification Techniques that Adjust an Operating Frequency to Compensate for Aging Electronic Components

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APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Applicants hereby appeal the non-final rejection dated October 17, 2007, of claims 1 through 28 of the above-identified patent application. A previous Appeal Brief was submitted on July 13, 2007 and Applicants submit herewith a Request to Reinstate Appeal.

REAL PARTY IN INTEREST

The present application is assigned to International Business Machines Corporation, as evidenced by an assignment recorded on January 6, 2004 in the United States Patent and Trademark Office at Reel 014874, Frame 0585. The assignee, International Business Machines Corporation, is the real party in interest.

RELATED APPEALS AND INTERFERENCES

There are no related appeals and interferences.

STATUS OF CLAIMS

Claims 1 through 28 are presently pending in the above-identified patent application. Claims 1-8, 20, 23, and 24 are rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al. (United States Patent Number 5,331,579) in view of Norman et al. (United States Patent Number 5,956,289) and Morgan (United States Patent No. 6,525,603), claims 9 and 25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Wu et al. ("Bipolar Bootstrapped Multi-emitter BiCMOS (B^{2}M-BiCMOS) Logic for Low-Voltage Applications, Electronics, Circuits, and Systems," 1996, Volume 2, Pages 1174-1177), claim 10 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Chur (United States Patent Number 5,124,849), claim 11 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al., Morgan and Chur, and further in view of Ohie et al. (United States Patent Number 5,936,448), claim 12 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al., Morgan Chur, and Ohie et al., and further in view of Burns et al. (United States Patent Number 4,698,587), claims 13 and 21 are rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Hacker (United States Patent Number 4,845,419), claims 14-18 are rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Bassett et al. (United States Patent Number 5,127,008), claim 19 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Kolanek (United States Patent Application Publication Number 2002/0047745 A1), claim 22 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al., Morgan and Hacker, and further in view of Kolanek, claim 26 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Chur and Ohie et al., claim 27 is rejected under 35 U.S.C. §103(a) as being

unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Iida et al. (United States Patent Number 6,525,585), and claim 28 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al. and Norman et al., and Takáhashi (United States Patent Number 6,253,358) and Morgan. Claims 1, 4, 5, 9, 11, 20, and 28 are being appealed.

STATUS OF AMENDMENTS

There have been no amendments filed subsequent to the final rejection

SUMMARY OF CLAIMED SUBJECT MATTER

Independent claim 1 requires a method of frequency modification for one or more electronic components in an electronic system (page 4, line 11, to page 5, line 8), the method comprising the steps of: determining, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system (page 13, line 12, to page 14, line 11); and adjusting an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters (page 14, line 3, to page 15, line 3).

Independent claim 20 requires an electronic system able to perform frequency modification for electronic components (page 4, line 11, to page 5, line 8), the electronic system comprising: one or more electronic components; at least one clock generation circuit coupled to the one or more electronic components and adapted to: determine, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system (page 13, line 12, to page 14, line 11); and adjust an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters (page 14, line 3, to page 15, line 3).

Independent claim 28 requires an article of manufacture for performing frequency modification for electronic components (page 4, line 11, to page 5, line 8), the article of manufacture comprising: a computer readable medium containing one or more programs which when executed implement the steps of: determining, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system (page 13, line 12, to page 14, line 11); and adjusting an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters (page 14, line 3, to page 15, line 3).

In one exemplary embodiment, a given performance parameter comprises a multiplicand used to convert a base frequency to the selected operating frequency to be used in the step of adjusting (page 14, lines 14-16).

In one exemplary embodiment, the step of determining a performance parameter further comprises the steps of determining whether the particular age of the electronic system is a predetermined age, and determining an operating frequency from the one or more performance parameters when the particular age is the given age (page 9, line 16, to page 10, line 13; FIG. 1B: 9; FIG. 2: 200).

In one exemplary embodiment, the step of gathering, at the particular age of the electronic system, performance statistics from one or more age-monitoring circuits further comprises the step of determining, at the particular age of the electronic system, a given performance statistic by comparing speed of an aged circuit with speed of a test circuit that is enabled only for the comparison, wherein the aged circuit has been operated for approximately the particular age (page 10, line 14, to page 11, line 11; page 11, line 21, to page 12, line 21).

In one exemplary embodiment, the step of gathering further comprises the step of determining that one or more errors have occurred; and the step of adjusting an operating frequency further comprises the steps of lowering operating frequency from a current operating frequency, beginning execution at a point before the one or more errors occurred, determining if the one or more errors reoccur, and if the one or more errors do not reoccur, leaving the lowered

operating frequency as the current operating frequency (page 15, line 10, to page 16, line 5; FIG. 6: 600).

STATEMENT OF GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1 through 28 are presently pending in the above-identified patent application. Claims 1-8, 20, 23, and 24 are rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al. in view of Norman et al. and Morgan, claims 9 and 25 are rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Wu et al., claim 10 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Chur, claim 11 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al., Morgan, and Chur, and further in view of Ohie et al., claim 12 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al., Morgan, Chur, and Ohie et al., and further in view of Burns et al., claims 13 and 21 are rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Hacker, claims 14-18 are rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Bassett et al., claim 19 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Kolanek, claim 22 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and Hacker, and further in view of Kolanek, claim 26 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Chur and Ohie et al., claim 27 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al. and Morgan, and further in view of Iida et al., and claim 28 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al. and Norman et al., and Takahashi and Morgan.

ARGUMENT

Independent Claims 1, 20 and 28

Independent claims 1 and 20 are rejected under 35 U.S.C §103(a) as being unpatentable over Maguire, Jr. et al. in view of Norman et al. and Morgan, and claim 28 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al., Morgan, and Takahashi. Regarding claim 1, the Examiner asserts that Maguire, Jr. et al. teach determining, at a particular age of the electronic system, one or more performance parameters for the electronic system (col. 1, lines 10-19; col. 3, lines 28-39). The Examiner acknowledges that Maguire, Jr. et al. do not teach the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters.

The Examiner asserts, however, that Morgan teaches that "variations due to, for example, component age, component tolerance, or operating conditions such as temperature, power supply voltage, operating frequency, and humidity, may adversely affect the performance of the feedforward amplifier." (citing Morgan at col. 2, lines 19-23). As discussed hereinafter, while Morgan may generally note that in conventional feedforward amplifiers variations due to component age may adversely affect the performance of the feedforward amplifier, Morgan does not disclose or suggest *a solution* for such problem. Further, Morgan does not disclose or suggest "one or more performance parameters *correlated with maximum operating frequency* of one or more electronic components of the electronic system *for the particular age* of the electronic system." In addition, Morgan does ***not*** disclose or suggest *adjusting an operating frequency of the one or more electronic components* from the electronic system *in accordance with the one or more performance parameters, wherein the one or more performance parameters are correlated with maximum operating frequency of one or more electronic components of the electronic system* ***for the particular age*** *of the electronic system.*

The Examiner further asserts that Norman et al. teach that the memory monitors temperature and voltage and adjusts an oscillator circuit to maintain an ideal operating frequency (abstract).

Applicants note that the Examiner has *not* alleged that any of the cited references discloses or suggests one or more performance parameters *correlated with maximum operating frequency* of one or more electronic components of the electronic system ***for the particular age*** of the electronic system.

Applicants also note that Maguire et al. teach that

> the present invention is a computer-based modeling system designed to improve the overall performance of components and systems that degrade with age. The invention combines expert rules, probabilistic models, and deterministic models to *evaluate and predict the effect of component aging on* ***component life extension, operational readiness, maintenance effectiveness, and safety of a system along with evaluating and recommending maintenance and operational actions to improve the overall performance of the modeled system***.
> (Col. 1, lines 10-19; emphasis added.)

Maguire et al. further teach that "the information is processed by the system to obtain ***output values of the life left, the failure probabilities, the useful service, and the life profiles of the systems and components***." (Col. 5, lines 34-37; emphasis added.) Thus, Maguire does ***not*** disclose or suggest ***adjusting an operating frequency of the one or more electronic components*** from the electronic system *in accordance with the one or more performance parameters, wherein the one or more performance parameters are* ***correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system***.

Finally, Applicants note that Norman et al. disclose "circuitry to detect ***environmental conditions*** *such as temperature and supply voltage* and adjust the operation of the circuit accordingly." (See, abstract; emphasis added.) Applicants could find *no* disclosure or suggestion in Norman that the *particular age* of the electronic system is considered. Thus, Norman et al. do ***not*** disclose or suggest *adjusting an operating frequency of the one or more electronic components* from the electronic system *in accordance with the one or more performance parameters, wherein the one or more performance parameters are correlated with*

maximum operating frequency of one or more electronic components of the electronic system ***for the particular age*** *of the electronic system.*

Independent claims 1, 20, and 28 require determining, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters.

Thus, Maguire, Jr. et al., Norman et al. and Morgan, alone or in any combination, do not disclose or suggest determining, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters, as required by independent claims 1, 20, and 28.

<u>Additional Cited References</u>

Wu et al. was also cited by the Examiner for its disclosure to compare speed performance of the new BiCMOS logic circuit with those of CMOS, conventional BiCMOS, and Bootstrapped BiCMOS logic circuits (Abstract).

Applicants note that Wu et al. is directed to the bipolar bootstrapped multi-emitter BiCMOS logic and to HSPICE simulations that compare the BiCMOS logic circuit with those of CMOS, conventional BiCMOS, and Bootstrapped BiCMOS logic circuits. Wu et al. do not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Chur was also cited by the Examiner for its disclosure of the testing of completed head disk assemblies (HDA) ....develop into a problem as the HAD ages.

Applicants note that Chur is directed to a method for detecting aberrations in a digital data storage medium, such as a magnetic media disk. (See, Abstract.) Chur does not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Ohie et al. was also cited by the Examiner for its disclosure of decreasing the noise supply by lowering the operating frequency while threshold voltages are measured to reduce measuring errors.

Applicants note that Ohie et al. is directed to an integrated circuit in which Schmitt input circuits can be tested in a short time and a highly accurate test result can be obtained. (See, Abstract.) Ohie et al. do not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Burns et al. was also cited by the Examiner for its disclosure of determining the maximum operating frequency for which the integrated circuit operates correctly (no logic errors)

Applicants note that Burns et al. is directed to a method for characterizing critical timing paths and analyzing timing related failure modes in high clock rate photocurrent at the drain of a single transistor in a very large scale integrated circuit. (See, Abstract.) Burns et al. do not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance

parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Hacker was also cited by the Examiner for its disclosure that the performance of a given type of battery in actual use can be accurately judged since the battery system can itself maintain a count of accumulated hours of use, and other relevant parameters.

Applicants note that Hacker is directed to a portable system wherein the user can obtain a relatively accurate indication of the battery energy remaining available for use at any time during a portable operating cycle. (Col. 1, lines 51-54.) Hacker does not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Bassett et al. was also cited by the Examiner for its disclosure that the second module testing process is performed when it is necessary to enhance the operational reliability of shipped modules, by accelerating and provoking the immediate failure of those correctly but marginally fabricated devices and modules which would otherwise fail early in their expected operational lifespan.

Applicants note that Bassett et al. is directed to a method and apparatus for designing very large scale integrated circuit devices, most particularly level sensitive scan design (LSSD) devices, by inclusion of a plurality of distributed delay lines originating at input terminals of the device, and controlling the inhibiting and enabling of driver circuits connected to the output terminals of the device, as required to regulate operation of device drivers during a plurality of testing operations. (See, Abstract.) Bassett et al. do not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the

particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Kolanek was also cited by the Examiner for its disclosure of the set of desired or set point values for the performance parameters, which are provided to the SLMC 320 from some external source such as a wireless communication network system operator.

Applicants note that Kolanek is directed to a signal level and gain management scheme wherein variable internal gain elements are introduced into the LINC amplifier structure in order to maintain internal signal levels at predetermined levels (e.g. optimum signal levels, such as, for example, an optimum SNR) while at the same time permit control of the net gain of the LINC amplifier. (See, paragraph 0014.) Kolanek does not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Iida et al. was also cited by the Examiner for its disclosure that the clock generation circuit... manufacture (FIG. 6; col. 3, lines 52-61).

Applicants note that Iida et al. is directed to a fixed-length delay generation circuit designed to restrain variations in delay values caused by, for example, temperature variations. (Col. 1, lines 7-11.) Iida et al. do not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Takahashi was also cited by the Examiner for its disclosure that a computer-readable medium... performs the steps. (Col. 18, lines 60-64.)

Applicants note that Takahashi is directed to a method for supporting the design of the semiconductor integrated circuit for the prediction of the performance of a large-scale

integrated circuit (LSI) and a system using the same method. (Col. 1, lines 7-14.) Takahashi does not address the issue of determining, at a particular age of an electronic system, one or more performance parameters for the electronic system, wherein the one or more performance parameters are correlated with a maximum operating frequency of electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the electronic components in accordance with the one or more performance parameters.

Thus, Wu et al., Chur, Ohie et al., Burns et al., Hacker, Bassett et al., Kolanek, Iida et al., and Takahashi, alone or in combination, do not disclose or suggest determining, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system; and adjusting an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters, as required by independent claims 1, 20, and 28.

<u>Claim 4</u>

Claim 4 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al. in view of Norman et al. and Morgan. In particular, the Examiner asserts that Norman teaches wherein the given performance parameter comprises a multiplicand used to convert a base frequency to the selected operating frequency to be used in the step of adjusting (col. 10, lines 39-42).

In the text cited by the Examiner, Norman teaches that "the temperature range setting corresponds to an *<u>oscillator offset value</u>* that is used to alter the oscillator frequency, via a change in the delay stages, to compensate for the temperature range variations." (Col. 10, lines 39-42; emphasis added.) Norman does *not*, however, disclose or suggest a *multiplicand used to convert a base frequency to the selected operating frequency*. Claim 4 requires wherein the given performance parameter comprises a *multiplicand used to convert a base frequency to the selected operating frequency to be used in the step of adjusting*.

Thus, Maguire, Jr. et al., Norman et al. and Morgan, alone or in any combination, do not disclose or suggest wherein the given performance parameter comprises a multiplicand used to convert a base frequency to the selected operating frequency to be used in the step of adjusting, as required by claim 4.

Claim 5

Claim 5 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al. in view of Norman et al. and Morgan. In particular, the Examiner asserts that Maguire teaches the step of determining a performance parameter further comprises the steps of determining whether the particular age of the electronic system is a predetermined age when the particular age is the given age (col. 3, lines 28-32), and that Norman teaches determining an operating frequency from the one or more performance parameters (col. 21, lines 28-30).

In the text cited by the Examiner, Norman teaches "wherein the control circuitry adjusts the frequency of the clock signal to optimize performance of the flash memory device." (Col. 21, lines 28-30.) Norman does *not*, however, disclose or suggest determining an operating frequency from the one or more performance parameters *when the particular age is the given age*. Claim 5 requires wherein the step of determining a performance parameter further comprises the steps of *determining whether the particular age of the electronic system is a predetermined age, and determining an operating frequency from the one or more performance parameters when the particular age is the given age*.

Thus, Maguire, Jr. et al., Norman et al. and Morgan, alone or in any combination, do not disclose or suggest wherein the step of determining a performance parameter further comprises the steps of determining whether the particular age of the electronic system is a predetermined age, and determining an operating frequency from the one or more performance parameters when the particular age is the given age, as required by claim 5.

Claim 9

Claims 9 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al. in view of Norman et al. and Morgan, and further in view of Wu et al. In particular, the Examiner acknowledges that Maguire, Norman and Morgan do not explicitly teach the limitation of claim 9, but asserts that Wu teaches to compare speed performance of the new BiCMOS logic

circuit with those of CMOS, conventional BiCMOS, and Bootstrapped BiCMOS logic circuits (Abstract).

Wu does not, however, disclose or suggest *a given performance statistic by* _*comparing speed of an aged circuit with speed of a test circuit*_ *that is enabled only for the comparison,* _*wherein the aged circuit has been operated for approximately the particular age*_. Claim 9 requires wherein the step of gathering, at the particular age of the electronic system, performance statistics from one or more age-monitoring circuits further comprises the step of determining, at the particular age of the electronic system, *a given performance statistic by* _*comparing speed of an aged circuit with speed of a test circuit*_ *that is enabled only for the comparison,* _*wherein the aged circuit has been operated for approximately the particular age*_.

Thus, Maguire, Jr. et al., Norman et al., Morgan, and Wu et al., alone or in any combination, do not disclose or suggest wherein the step of gathering, at the particular age of the electronic system, performance statistics from one or more age-monitoring circuits further comprises the step of determining, at the particular age of the electronic system, a given performance statistic by comparing speed of an aged circuit with speed of a test circuit that is enabled only for the comparison, wherein the aged circuit has been operated for approximately the particular age, as required by claim 9.

<u>Claim 11</u>

Claim 11 is rejected under 35 U.S.C. §103(a) as being unpatentable over Maguire, Jr. et al., Norman et al., Morgan and Chur, and further in view of Ohie et al. In particular, the Examiner acknowledges that Maguire, Norman, Morgan and Chur do not explicitly teach the limitation of claim 11, but asserts that Ohie discloses that, to reduce measuring errors, the noise supply is decreased by lowering the operating frequency while threshold voltages are measured (col. 1, lines 55-57).

In the text cited by the Examiner, Ohie teaches that, "to *reduce these measuring errors*, the noise supply is decreased by lowering the operating frequency _*while threshold voltages are measured*_." (Col. 1, lines 55-57; emphasis added.) Ohie does not, however, disclose or suggest _*lowering the operating frequency*_ *from a current operating frequency, beginning execution* _*at a point before the one or more errors occurred*_, *determining if the one or*

more errors reoccur, and if the one or more errors do not reoccur, leaving the lowered operating frequency as the current operating frequency. Claim 11 requires wherein the step of gathering further comprises the step of determining that one or more errors have occurred; and the step of adjusting an operating frequency further comprises the steps of *lowering operating frequency from a current operating frequency, beginning execution at a point before the one or more errors occurred, determining if the one or more errors reoccur, and if the one or more errors do not reoccur, leaving the lowered operating frequency as the current operating frequency.*

Thus, Maguire, Jr. et al., Norman et al., Morgan, Chur, and Ohie et al., alone or in combination, do not disclose or suggest wherein the step of gathering further comprises the step of determining that one or more errors have occurred; and the step of adjusting an operating frequency further comprises the steps of lowering operating frequency from a current operating frequency, beginning execution at a point before the one or more errors occurred, determining if the one or more errors reoccur, and if the one or more errors do not reoccur, leaving the lowered operating frequency as the current operating frequency, as required by claim11.

Conclusion

The rejections of the cited claims under section §103 in view of Maguire, Jr. et al., Norman et al., Morgan, Wu et al., Chur, Ohie et al., Burns et al., Hacker, Bassett et al., Kolanek, Iida et al., and Takahashi, alone or in any combination, are therefore believed to be improper and should be withdrawn. The remaining rejected dependent claims are believed allowable for at least the reasons identified above with respect to the independent claims.

The attention of the Examiner and the Appeal Board to this matter is appreciated.

Respectfully,

Date: January 16, 2008

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APPENDIX

1. A method of frequency modification for one or more electronic components in an electronic system, the method comprising the steps of:

determining, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system; and

adjusting an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters.

2. The method of claim 1, wherein the step of adjusting adjusts the operating frequency to an adjusted operating frequency, and wherein the adjusted operating frequency is less than or equal to the maximum operating frequency of the one or more electronic components for the particular age of the system.

3. The method of claim 1, wherein a given one of the one or more performance parameters can be converted to a selected operating frequency to be used in the step of adjusting.

4. The method of claim 3, wherein the given performance parameter comprises a multiplicand used to convert a base frequency to the selected operating frequency to be used in the step of adjusting.

5. The method of claim 1, wherein the step of determining a performance parameter further comprises the steps of determining whether the particular age of the electronic system is a predetermined age, and determining an operating frequency from the one or more performance parameters when the particular age is the given age.

6. The method of claim 5, wherein a given one of the one or more performance parameters comprises a predetermined operating frequency to be used in the steps of determining and adjusting.

7. The method of claim 1, wherein the step of determining, at a particular age of the electronic system, a performance parameter for the electronic system, further comprises the step of gathering, at the particular age of the electronic system, performance statistics from one or more feedback circuits, and determining whether actual performance of the electronic system should be adjusted by using the performance statistics.

8. The method of claim 7, wherein the step of gathering, at the particular age of the electronic system, performance statistics from one or more feedback circuits, further comprises the step of gathering, at the particular age of the electronic system, performance statistics from one or more age-monitoring circuits.

9. The method of claim 8, wherein the step of gathering, at the particular age of the electronic system, performance statistics from one or more age-monitoring circuits further comprises the step of determining, at the particular age of the electronic system, a given performance statistic by comparing speed of an aged circuit with speed of a test circuit that is enabled only for the comparison, wherein the aged circuit has been operated for approximately the particular age.

10. The method of claim 7, wherein the step of gathering, at the particular age of the electronic system, performance statistics from one or more feedback circuits, further comprises the step of gathering, at the particular age of the electronic system, performance statistics from one or more error detecting circuits.

11 The method of claim 10, wherein:

the step of gathering further comprises the step of determining that one or more errors have occurred; and

the step of adjusting an operating frequency further comprises the steps of lowering operating frequency from a current operating frequency, beginning execution at a point before the one or more errors occurred, determining if the one or more errors reoccur, and if the one or more errors do not reoccur, leaving the lowered operating frequency as the current operating frequency.

12. The method of claim 11, wherein the step of adjusting further comprises, before the step of lowering operating frequency, the steps of beginning execution at a point before the one or more errors occurred, determining if the one or more errors reoccur, and if the one or more errors do not reoccur, leaving current operating frequency alone.

13. The method of claim 1, wherein the one or more performance parameters comprise one or more of previous operating frequency, ambient temperature, hours of operation, and supply voltage.

14. The method of claim 1, wherein the one or more performance parameters are stored performance parameters and wherein the method further comprises the step of performing reliability testing to determine wear-out information comprising the stored performance parameters.

15. The method of claim 14, wherein the stored performance parameters comprise predetermined ages and predetermined operating frequencies at corresponding ones of the predetermined ages.

16. The method of claim 14, wherein the step of performing reliability testing further comprises the step of determining one or more prior operating frequencies of the electronic system, one or more ambient temperatures surrounding the electronic system, and one or more supply voltages of the electronic system.

17. The method of claim 16, further comprising the step of providing supply voltage for the electronic system that is higher than nominal supply voltage.

18. The method of claim 16, further comprising the step of providing ambient temperature surrounding the electronic system that is higher than nominal ambient temperature

19. The method of claim 1, wherein the performance parameters are received from an external source.

20 An electronic system able to perform frequency modification for electronic components, the electronic system comprising:

one or more electronic components;

at least one clock generation circuit coupled to the one or more electronic components and adapted to:

determine, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system; and

adjust an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters.

21. The electronic system of claim 20, wherein:

the performance parameters comprise a plurality of predetermined ages and a corresponding plurality of predetermined operating frequencies;

the at least one clock generation circuit comprises a wear-out clock;

the wear-out clock is adapted to determine, at a particular age of the electronic system, one or more of the predetermined ages and to determine whether a current age of the electronic system corresponds to a given one of the predetermined ages; and

the wear-out clock is further adapted to adjust operating frequency of the one or more electronic components by adjusting a current operating frequency of the one or more electronic components to a predetermined operating frequency corresponding to the given predetermined age.

22. The electronic system of claim 21, wherein the wear-out clock is further adapted to retrieve the predetermined ages and corresponding predetermined operating frequencies from a source external to the wear-out clock

23. The electronic system of claim 20, wherein the at least one clock generation circuit further comprises a performance control unit.

24. The electronic system of claim 23, further comprising one or more feedback circuits in the one or more electronic components, the one or more feedback circuits coupled to the performance control unit.

25. The electronic system of claim 24, wherein a given one of the one or more performance parameters comprises one or more performance statistics, wherein a given one of the feedback circuits comprises an age-monitoring circuit comprising an aged circuit and a new circuit, wherein the performance control unit is adapted to enable the new circuit only during a comparison between the aged and new circuits and to determine the one or more performance statistics from the comparison, wherein the aged circuit has been operated for approximately the particular age

26. The electronic system of claim 24, wherein:

a given one of the one or more performance parameters comprises one or more performance statistics;

a given one of the feedback circuits comprises an error detecting circuit, the error detecting circuit adapted to determine if an error occurs, wherein the one or more performance statistics indicate than an error has occurred;

the performance control unit is further adapted to receive the one or more performance statistics, indicating that one or more errors have occurred, from the error detection circuit, to lower operating frequency from a current operating frequency, to cause execution to begin at a point before the one or more errors occurred, to determine if the error reoccurs, and if the error does not reoccur, to leave the lowered operating frequency as the current operating frequency.

27. The electronic system of claim 20, wherein the at least one clock generation circuit further comprises an oscillator and one or more frequency multipliers, the oscillator having an output, each of the one or more of the frequency multipliers having an input and output, the output of the oscillator coupled to an input of each of the one or more frequency multipliers, a given one of the one or more electronic components coupled to an output of a given one of the one or more frequency multipliers, and wherein the at least one clock generation circuit is further adapted to create an adjusted operating frequency for the given electronic component by adjusting one or more of the following: operating frequency of the oscillator and a multiplicand used in the given frequency multiplier.

28. An article of manufacture for performing frequency modification for electronic components, the article of manufacture comprising:

a computer readable medium containing one or more programs which when executed implement the steps of:

determining, at a particular age of the electronic system, one or more performance parameters for the electronic system, the one or more performance parameters correlated with maximum

operating frequency of one or more electronic components of the electronic system for the particular age of the electronic system; and

adjusting an operating frequency of the one or more electronic components from the electronic system in accordance with the one or more performance parameters.

EVIDENCE APPENDIX

There is no evidence submitted pursuant to § 1.130, 1.131, or 1.132 or entered by the Examiner and relied upon by appellant.

RELATED PROCEEDINGS APPENDIX

There are no known decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37.